Original Research Article

A Study of Coronary Atherosclerosis and its Grading in Medico-Legal Autopsy Cases of 20-60 Years Age Groupat SMS Hospital, Jaipur

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Abstract

Atherosclerosis is a chronic degenerative condition of arteries responsible for significant cardiovascular morbidity and mortality worldwide. In the Indian subcontinent, it is reported to be responsible for more than 25% of deaths. This study has been undertaken to study coronary atherosclerosis and it's grading in medico-legal autopsies of subjects between 20-60 years. This hospital based descriptive observational study was carried out during the year 2016-17 after obtaining due clearance from research and review board of our Medical College. Out of 120 cases, there were 90 cases (75%) of males and rest 30 (25%) females. Left anterior descending artery was the most commonly affected artery which showed presence of atherosclerotic lesions in most positive cases. However, triple vessel disease was found in 50% cases with atherosclerosis accounting for 21.66% of total cases. This study was intended to collect data regarding the presence of coronary artery disease and its evidence in medico-legal deaths with no clinical evidence or history of this disease or any complications resulting from it.
Keywords: Coronary atherosclerosis, Medico legal autopsy, Left anterior descending artery.

Introduction

Coronary artery disease remains globally the leading cause of death and long term morbidity.[1] Lifestyles and dietary habits are the major contributory factors for the changing trends. [1,2]

Atherosclerosis constitutes the major cause for ischemia which may result in myocardial infarction leading to death, which present as sudden, unexpected deaths, forming major share of the autopsies conducted in any set up.

The medico-legal opinion may be asked about the state of coronary artery in sudden death in road accidents and operations. In cases of litigation for compensation purposes, the degree of damage suffered by the victim due to trauma has to be carefully accessed and no misplaced humanitarian consideration should unnecessarily lead to an award of higher damages. Not many studies have been done in medico-legal autopsies to assess the exact magnitude of this silent enemy of human life. In recent times the age for coronary atherosclerosis has seen asignificant downfall showing that people atyounger age are also more prone to fatal risks of coronary artery disease leading to sudden deaths of individuals at youngerage group.

This study has been undertaken to study coronary atherosclerosis and it's grading in medico-legal autopsies of subjects between 20-60 years. This study might help the autopsy surgeons to reachto conclusion of cause of death in such ambiguous autopsies and also assist the law governing agencies to reach to aspecific conclusion in disputed matters.

Material and Method

This study was carried out at the Department of Forensic Medicine, SMS Medical College, Jaipur with assistance from Department of Pathology, for preparation and analysis of samples after obtaining due clearance from research and review board of SMS Medical College andHospital, Jaipur.

Study Design: Hospital based Descriptive Observational Study.

Study Period: 1st April, 2016 to 31st March, 2017.

Inclusion Criteria: Subjects between 20-60 years autopsied at mortuary of SMS Hospital, Jaipur whose attendants consented to be a part of the study.

Exclusion criteria:

1. Cases with congenital heart disease.
2. Decomposed bodies.
3. Extensively mutilated bodies.
4. Those cases whose attendants and relatives refused to give consent.

Method:

Consecutive cases were selected as per inclusion and exclusion criteria, all information regarding of the details of the case, incidence, socio demographic profile, related past clinical history and present clinical condition of the subject were recorded according to pre-designed Performa after proper history taking from the attendants or near relatives, details of inquest report and available clinical and treatment record. Autopsy Examination was performed as per norms after fulfilling all medico-legal formalities. All details pertaining to external and internal findings, pattern of injuries and cause and manner of death, were observed and recorded as per proforma. The known risk factors of coronary artery disease like hypertension, diabetes were especially noted in the proforma to correlate their co- existence with demonstrable coronary artery disease. Thus, tabulations were also done according to the presence or absence of known risk factors and the presence of absence of demonstrable coronary atherosclerosis on dissection of heart.

Left anterior descending artery, left circumflex and right coronary artery was serially examined by a cut 5mm apart, percentage of occlusion was noted of the coronaries when examined by hand lens and was graded from grade 0 (no narrowing /normal) to grade IV (complete obliteration).

Grade – 0	:	Normal
Grade – I	:	1-25% stenosis
Grade – II	:	26-50% stenosis
Grade – III	:	51-75% stenosis
Grade – IV	:	76-100% stenosis

The histopathological examinations were done, and findings noted under the supervision of Department of Pathology, SMS Medical College, Jaipur

Sampling:

120 cases satisfying the inclusion and exclusion criteria were included in this study on first come first basis after starting the study.

Statistical Analysis:

The finally analyzed data were tabulated in Microsoft Excel Worksheet and statistically analyzed using appropriate statistical software to determine its significance at 95% confidence limits. Continuous data were expressed in form of proportion and percentages differences in proportion was analyzed using chi square test. $P<0.05$ were considered significant. All statistical calculations and tabulation were done using SPSS version 16 software.

Results

Out of 120 cases, there were 90 cases (75%) of males and rest 30 (25%) females. As per inclusion criteria subjects to be included in study had to be between 20-60 years of age. Hindus accounted 92.5% case included in the study. Slightly more study subjects were belonging to rural areas (50.83%) as compared to (49.16%) in urban areas.

34.16% study subjects had presence of co-existing known risk factor diseases viz. Hypertension and Diabetes Mellitus. Amongst cases with Co-existing risk factor diseases, hypertension was seen in majority of cases (75.60%) and both hypertension and diabetes together were seen in 24.40% cases in the present study.

A total of 66 subjects out of 120 (55%) had history of addiction to some substance of abuse. Majority of the study subjects (80%) were people with normally active life. 19.16% were hard workers and a single case included in the present study was a sportsman. 71.66% study subjects were vegetarians and rest 28.33% were non vegetarians.

Out of 120 cases, 52 cases (43.33%) showed presence of atherosclerosis of one or more coronary artery. Out of 52 positive cases, 26 cases had three vessel disease followed by 15 cases with blockage in two arteries and 11 cases had one artery blockage. 51.1% cases of male subjects and 20% of female subjects showed the presence of atherosclerotic lesions in one or more vessels. Males were affected more than females.

The study subjects which had coexisting diseases showed higher proportion of cases with atherosclerosis in their vessels. Activity profile of lifestyle did not show any predilection to coronary artery disease. The cases with presence of diseases like hypertension and diabetes, the known risk factors had more prevalence of coronary artery disease especially three vessel disease.

38.37% of the vegetarian eaters and 55.88% of the non-vegetarian eaters showed the presence of atherosclerotic disease. Left anterior descending artery was the most commonly affected artery which showed presence of atherosclerotic lesions in most positive cases. However, triple vessel disease was found in 50% cases with atherosclerosis accounting for 21.66% of total cases.

Table 1: Distribution of cases according to alleged medical history

Type of Incidence	No. of cases	Percentage
Unknown	43	35.83%
Sudden death	34	28.33%
Excess alcohol	10	8.33%
Hanging	9	7.5%
Chest pain	9	7.5%
Assault	5	4.16%
RTA	3	2.5%
Snake bite	3	2.5%
FFH	3	2.5%
Electrocution	1	0.84%
Total	**120**	**100%**

Table 2: Right coronary artery

RCA		No.of cases	%age
Atherosclerosis lesion		41	34.17%
Grade of Nar-rowingLumen	Grade 0	79	65.83%
	Grade 1	13	10.83%
	Grade 2	16	13.33%
	Grade 3	7	5.83%
	Grade 4	5	4.16%
Type of Athero-sclerosis	Atheroma	16	38.09%
	Complicated	7	16.66%
	Fatty	13	30.95%
	Fibro-atheroma	6	14.28%

Table 3: Left anterior descending artery

LAD		No. of cases	Percentage
Atherosclerosis lesion		49	40.83%
Grade of Nar-rowingLumen	Grade 0	71	59.18%
	Grade 1	19	15.83%
	Grade 2	13	10.83%
	Grade 3	10	8.33%
	Grade 4	7	5.83%
Type of Athero-sclerosis	Atheroma	12	24.48%
	Complicated	12	24.48%
	Fatty	16	32.65%
	Fibro-atheroma	9	18.36%

Table 4: Left circumflex artery

LCA		No. of cases	%age
Atherosclerosis lesion		30	25%
Grade of Narrowing Lumen	Grade 0	90	75%
	Grade 1	11	9.16%
	Grade 2	10	8.33%
	Grade 3	9	7.5%
	Grade 4	0	0%
Type of Athero-sclerosis	Atheroma	6	20%
	Complicated	6	20%
	Fatty	9	30%

Fibroathero-sclerosis	9	30%

Discussion

Coronary artery disease is a major cause of death and disability in developed countries.

Gender:

In this study there was male preponderance (75%) as compared to female (25%) which are more or less similar to most of the studies done in past. Murthy et al [3] studied 150 cases out of which 123 (82%) were males and 27(18%) were females. Singh et al [4] studied 200 cases with 170 (85%) males and 30 (15%) females. Padmavati et al [5] and Tandon et al [6] found 66.5% males and 33.5% females in their study. Similarly, Bhargava, et al [7] studied 74.8% males and 24.2% females in their study. Golshahi J, et al. (2005) [8] found male: female ratio was 8.2:1 and Prabhu MH, et al. (2013) [9] found that males were affected more than females. The reason being that as males are bread earners and females usually doing household work, which makes the males more vulnerable to medico-legal incidents like- accidents, violence and stress.

Age:

Maximum numbers of cases included in the present study were in middle age group (above 30 yrs) which is more prone to medico-legal deaths. The age for cases with presence of coronary athero-sclerosis have shown a trend of downfall in pre-dominant age group showing that people at younger age are also more prone to fatal risks of coronary artery disease leading to sudden deaths of individuals at younger age group. Different authors have conducted their studies on varying age groups like 0-80 years [Wig, et al (1962)], [10] 19-80 years [Prabhu MH, et al (2013)] [9].

Religion, Region & dietary habits:

The present study found that the majority of cases (92.5%) were Hindus, mostly residing in rural (50.83%) regions. Vegetarians were more common (71.66%) as compared to 28.33% cases of non-vegetarians. Similar findings were recorded by Prabhu MH, et al. (2013)[9] who found that religion and vegetarianism had lesser effect on athero-sclerosis.

Risk Factors:

Present study also showed Hypertension was most common past illness (75.60%), smoking (33.33%) and alcohol (22.72%) was common type of

drug addiction, strong association of coronary atherosclerosis with various cardiovascular risk factors, like diabetes mellitus, smoking, hypertension and alcohol consumption. Furthermore, higher grade of lesions were associated with the coexistence of multiple risk factors. Findings similar to the present study were also shown by Gerald S. Berenson et al (1998). [11]

These findings support the concept that multiple risk factors have a synergistic effect on the development of coronary atherosclerosis. Similar correlation has been shown by Gerald S. Berenson etal. [11] Prabhu MH, et al. (2013) [9] found that upper class, obesity, alcohol consumption and cigarette smoking trends have dominant role in acceleration of atherosclerotic lesions. Prasad VN, et al (2014) [12] reported that association with various modifiable or non-modifiable risk factors like age, sex, diabetes mellitus, hypertension, smoking and alcohol intake had a synergistic effect on the progression of coronary atherosclerosis. Manvar PJ et al (2016) [13] found that most common risk factor observed in death due to coronary artery disease was Hypertension (20.09%), followed by smoking (14.95%) and followed by diabetes mellitus (12.62%).

Incident of medico-legal death:

The incident of death was unknown (36%), followed by 28% sudden death, 8% excess alcohol and 7.5% each was hanging & chest pain in our study. A study done by Gupta S, et al (2011) [14] reported all the sudden deaths where causes of death were not known, whether person died in the house or in the hospital.

Blockage of coronary artery:

The present study showed that the out of 120 cases, 52 cases had blockage of coronary artery (43.33%). Out of 52, 26 cases (50%) had three artery blockage was occurred followed by 15 cases with two artery blockage and 11 cases had one artery blockage. Similar findings have been reported by Gohil M and Parmar K (2016) [15] that triple vessel involvement was seen in 44.4% cases. The results of the present study were quite low as compared to other studies conducted inside and outside India, for reason of variability in the study population of different studies and their selection criteria. 66% atherosclerosis cases in study [Prabhu MH, et al (2013), Karnataka] [9].

The atherosclerosis lesion was more commonly present in left anterior descending artery (41%) followed by 35% in right coronary artery & 25% in left coronary artery. Type of atherosclerosis was mostly atheroma and fatty type in left anterior descending artery, right coronary artery and mostly Fatty, fibro-atheroma (30% each) in left coronary artery. Similar findings have been suggested by Golshahi J, et al. (2005) [16] who found that most

frequently involved branches were left anterior descending, right coronary, left main and left circumflex arteries respectively. Dhruva GA(2012) [17] found left Anterior Descending Coronary was most commonly involved artery in atherosclerosis lesions. Similar results were found by Prabhu MH, et al. (2013)[9]. Mathur KS, et al (1961) [18] found that the atherosclerotic process starts earliest in the left anterior descending branch of the coronary arteries.

The extent of correlation is more marked between the two branches of the left coronary artery than that of either of them with the right coronary artery. Rao D, et al (2014) [19] concluded that coronary occlusion was the major contributory cause of sudden death with cardiac origin. Bambhaniya AB, et al (2015) [20] found that most common artery stenosis found was left anterior descending artery (LAD) and most of cases shows grade-3 or grade-4 stenosis. Manvar PJ, et al (2016) [13] found that narrowing of lumen was maximally observed in left anterior descending coronary artery, followed by right coronary artery and left circumflex artery and least in left main trunk. Grade 3 narrowing of coronary lumen was observed in maximum cases followed by grade 1 narrowing of lumen in cases while Grade 4 narrowing of coronary lumen was observed in least number of cases, which is similar to our results.

Conclusion

This study was intended to collect data regarding the presence of coronary artery disease and its evidence in medico- legal deaths with no clinical evidence or history of this disease or any complications resulting from it. Such pool of data will help the autopsy surgeons to reach to conclusion of cause of death in ambiguous autopsies and also assist the law governing agencies to reach to a specific conclusion in disputed matters.

Acknowledgement

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